Shaw™
Shaw E & I, Inc.

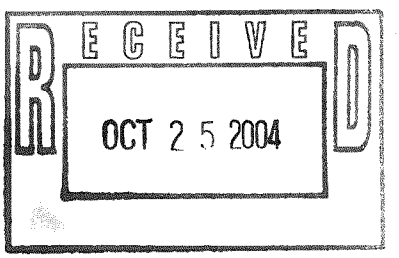
Geotechnical Laboratory
PO Box 4339
1570 Bear Creek Road
Oak Ridge TN 37830
865/482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

October 21, 2004

This is the Certificate of Analysis for the following samples:



Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.15000000**
Client Sampling Authorization Form No.	F04-013-024
Client Sample Data Group:	H2706
Date Received by Lab:	September 10, 2004
Number of Samples:	One (1)
Sample Type:	Soil

I. Introduction/Case Narrative

One soil sample was received by the Shaw Geotechnical Laboratory on September 10, 2004. The sample was submitted for determination of bulk density, sieve analysis, calcium carbonate content, hydraulic conductivity, and specific gravity. The sample number received was B19142.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole
Laboratory Manager, Geotechnical Services

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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock..... **ASTM D 2216**
Bulk Density of Soils..... **EM 1110-2-1906**
Particle-size Analysis of Soils..... **ASTM D 422**
Calcium Carbonate Content..... **ASTM D 4373**
Specific Gravity of Soil..... **ASTM D 854**

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.

- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.

- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.

- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

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- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.

- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None.

Appendix A
Sample Cross-Reference List

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Shaw Project Name: Eberline Hanford
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SAF No. F04-13-024
SDG No. H2706

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0441	B19142	Soil

Appendix B
Sample Test Results

October 21, 2004
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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.15000000

Field Sample No. B19142

Lab Sample No. BC0441

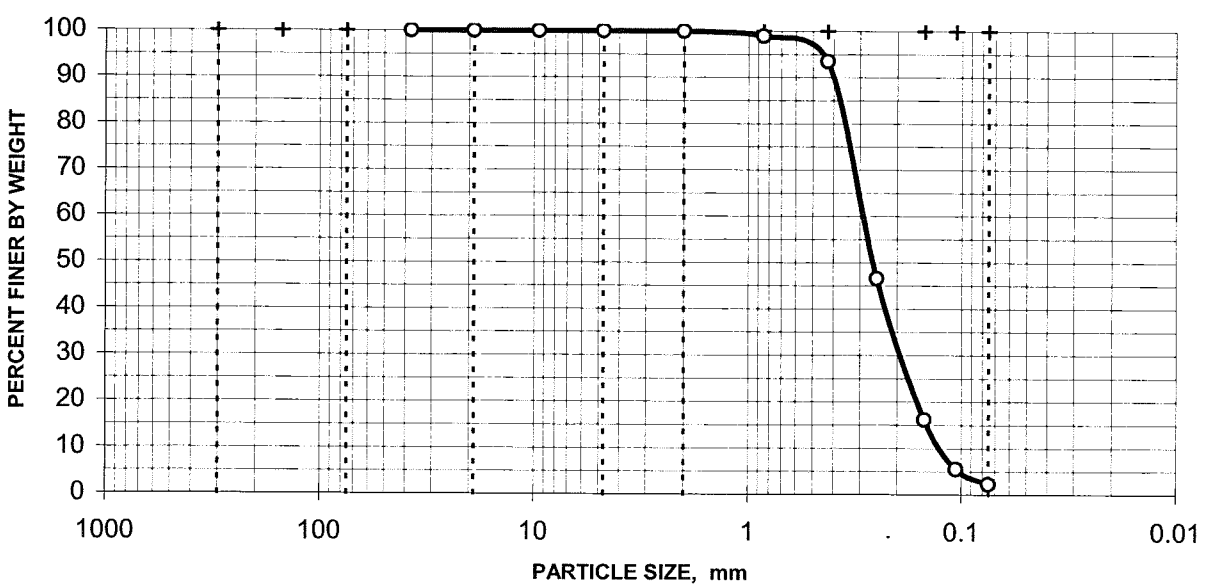
Moisture Content = 17.2%
based on dry sample weight

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	100.0%
	#4	4.750	100.0%
	#10	2.000	99.9%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	98.9%
	#40	0.425	93.5%
	#60	0.250	46.6%
	#100	0.149	16.2%
	#140	0.106	5.5%
	#200	0.075	2.3%

DISTRIBUTION CURVE



0.0% Gravel 97.7% Sand 2.3% Silt/Clay

0000007

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SPECIFIC GRAVITY
ASTM D 854

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.15000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	SPECIFIC GRAVITY
BC0441	B19142	2.6923

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BULK DENSITY/DRY DENSITY
EM-1110-2-1906, APPENDIX II

PROJECT NAME: **Eberline - Hanford**

PROJECT NUMBER: **100846.15000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC0441	B19142	5.9555	3.8795	2350.31	17.2	127.2	108.6

Moisture content calculated by ASTM D 2216 based on sample dry weight.
Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).
Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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Carbonate Content of Soils ASTM D 4373

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.15000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	CO3, %
BC0441	B19142	0

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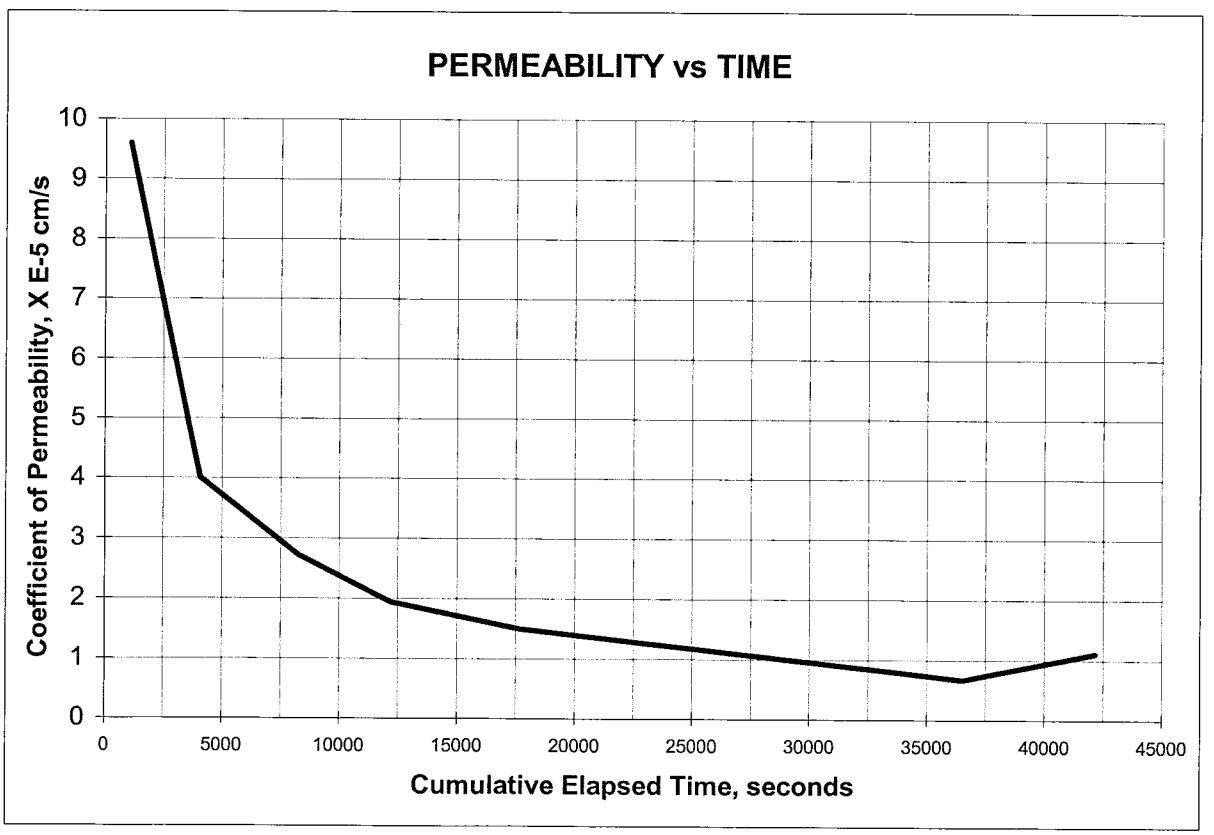
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

PROJECT NAME: Eberline Hanford
PROJECT NO. 100846.15000000
CLIENT SAMPLE NO. B19142
LAB SAMPLE NO. BC0441

	INITIAL	FINAL
Specimen diameter, cm	6.46	
Specimen length, cm	6.61	
Wet weight of specimen, g.	427.04	
Specimen cross-sect. area, cm^2	32.82	
Water content, %	25.2	
Wet unit weight, pcf	122.8	
Dry unit weight, pcf	98.1	
Degree of saturation, %	95.1	
Specific gravity of solids	2.69	

Hydraulic gradient	5.3
Min. consolidation stress, psi	2.0
Max. consolidation stress, psi	2.5
Total backpressure, psi	3.5
Permeant Fluid	Deaired DI Water

Coefficient of Permeability, cm/s 1.3E-05



Appendix C
Chain-of-Custody and Request-for-Analysis Records

SDG# H2706

PAGE 1 Eberline Srvces CHAIN OF CUSTODY ORD # R4-09-022

09/03/04 15:01:41 WORK ID: SAF# F04-013 SDG H2706

RCVD: 09/03/04 DUE: 10/18/04 KEEP: 10/18/05 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B19142	SHAW	DISPOS E331S E335S E342S

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
Fred Saw	9/8/04	Shaw.		Don Hendrickson/SHAW	9-10-04

BC 0441

0000013

100846 - SHAW - sample

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F04-013-024	Page 1 of 1
Collector: Johansen/Alexander/Gent/Thomas	Company Contact: Mark Byrnes; Telephone No.: 373-3996	Project Coordinator: TRENT, SJ	Price Code 8N; Data Turnaround 45 Days
Project Designation: 200-UP-1 Remedial Investigation Sampling and Analysis - S	Sampling Location: 200-UP-1, C4299; ~~305'-310'~~ 307.5 - 310 ft (DJA 9/1/04)	SAF No.: F04-013	Air Quality ☐
Ice Chest No.: GRP-03-018	Field Logbook No.: HNF-N-3841; COA: 119324ES10	Method of Shipment: Federal Express	
Shipped To: Shaw Group	Offsite Property No.: See PTR 14050	Bill of Lading/Air Bill No.: See PTR 14050	

POSSIBLE SAMPLE HAZARDS/REMARKS
~~N/A~~ Rad Rel to B19125

Special Handling and/or Storage
N/A

H2706 (7083)

Preservation			None	None
Type of Container			Moisture Resistant	Split Spoon Liner
No. of Container(s)			1	2
Volume			200g	1000g
SAMPLE ANALYSIS			Moisture Content - D2216 (crossed out, DJA 9/1/04)	See item (1) in Special Instructions.
Sample No.	**Matrix ***	**Sample Date**	**Sample Time**	
B19142	SOIL	9/1/04	1440	

BC 0441

CHAIN OF POSSESSION

Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
DJ Alexander / DJ Alexander	9/1/04 1645	Refrigerator #1	9/1/04 1645
[signature]	9/2/04 0830	M.A. Baechler / M.A. Baechler	9/2/04 0830
M.A. Baechler / M.A. Baechler	9/2/04 0830	Fed Ex	
Fed Ex	9/3/04	[signature]	9/3/04 12:30
[signature]	9/8/04 3:00	Fed Ex	

SPECIAL INSTRUCTIONS

(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Calcium Carbonate Content; Saturated Hydraulic Conductivity; Particle Density - D854

Liner GW Liner 3 = 3.0 KG
Liner GW Liner 4 = 3.0 KG

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By: [signature] DON HUSKEY	Title: SR. LAB. TECH	Date/Time: 09-10-04 @ 1100
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)